

THE AMERICAN JOURNAL OF
OPHTHALMOLOGY.

VOL. XIV.

JUNE, 1897.

NO. 6.

ORIGINAL ARTICLES.

BLEPHAROPLASTY.

BY CHAS. H. BEARD, M.D., CHICAGO, ILL.,

SURGEON TO THE ILLINOIS CHARITABLE EYE AND EAR INFIRMARY.

OLD, as is plastic surgery of the eyelids, and familiar as are most oculists with the various operative principles of this branch of the art, there is, in general, a singular disregard both of the possibilities and the opportunities here offered. While it is true that there is hardly an operator but who has essayed more or less in this line, relatively few have been persistent and painstaking. These two words are suggestive at once of the causes of the greatest number of successes, and of the reasons for nearly all of the failures. Aside from these considerations, results good or bad seem to hinge largely upon the matter of personal equation,—it is like the art of mechanics, some men are minus the aptitude. Others, again, have an actual aversion for the making of such operations, though one is led to suspect that it is apt to be an aversion born of disappointment.

Because the writer has been afforded rather an extended experience in this department of surgery, has been fairly persevering and observant, has endeavored to refine down and simplify detail and technique, that he presumes to offer this article, hoping thereby to furnish a timely hint or two to those

of his colleagues who may have been denied similar personal trial.

In this country blepharoplasty is oftenest undertaken for the relief of entropion and trichiasis resulting from trachoma; next, in frequency, for ectropion following burns, ulcers and other injuries. After these, perhaps, come those plastic operations which ordinarily attend the removal of neoplasms of the lids. I shall attempt, therefore, to describe methods of procedure, which in the several conditions above mentioned, viz., entropion with trichiasis, ectropion and neoplasms, have stood me in most excellent stead.

ENTROPION WITH TRICHIASIS.

Especial reference is made to that form which is due to chronic trachoma, or old granulated lids. Since these operations have for their chief object the correction of defects and deformities of the lids caused by destruction or lack of certain tissues, the great desideratum is usually the borrowing of suitable tissues with which to supply the want. Where such entropion exists, it is the conjunctiva that is deficient, and one needs to put the new tissue *within* the lines of cilia. Mucous membrane of the lower lip, *inside* of the mouth, makes the handiest and most fitting substitute.

Those afflicted with this malady come to us of every age, between that of the mere child of ten to fourteen years, and that of the septuagenarian, and with every degree of the deformity, from the incipiens incurvation, where only a few cilia touch the cornea, to that exaggerated condition where all the lashes of all four of the lids rest upon the globes. We are to be governed then in what we undertake not alone by the severity of the case, but also by the age of the patient.

While progressive atrophy of the conjunctiva, and of the tarsus is in a great measure responsible for the trouble, these factors alone can not account for the absence of the free borders, or feathering down of the normal thickness of the edges of the lids, which is present in all these cases. This unquestionably, is a result, mainly, of the prolonged blepharospasm or over-tension of the palpebral portion—and particularly of that of the border fibres of the orbicularis muscle, so characteristic of the disease in question. Chief then, among the ends

to be accomplished, in dealing with the defect, must be our aim to replace the tissues destroyed by the atrophic processes and to relieve the lid-tension. Now, the usual means employed for the purposes in question are trite enough, and were they usually effective, that is to say, permanently effective, my story were already at an end. But the customary and stereotyped means, according to my observation and experience, are not sufficient. All operators get beautiful results, but do they last? It is safe to affirm that they are, in the majority of instances, but brief—or at most, only temporary. As I said, many of our entropion patients are young persons, with their lives before them, and in order to make their relief enduring, it is necessary to replace one deformity by an opposite one; in other words, turn an entropion into an ectropion. Presumably it is possible to get too great an over-effect, but, as a matter of fact, this would seem to be a myth. One sees every day the folly of too little effect, but never a mistake in the other direction. No matter then, how slight the distortion of the lid, nothing short of excessive immediate effect will suffice.

Assuming, for example, that we have before us a marked entropion of the upper lid to correct, we proceed as follows: First, with strong, straight scissors, and with a single snip, a free external canthotomy is made, then the upper lid is grasped between the finger and thumb and pulled outward, making taut the external canthal ligament; the scissors are introduced at the wound, and this ligament is boldly incised, so that the lid is felt to give way. The lid is everted, and while being held so by the finger-tips placed on the lashes, or where the lashes should be, a deep incision is made just behind the follicles of the cilia, and hugging more the conjunctiva than the tarsus, and extending from as near as practicable to the punctum to the outer end of the tarsus. For this purpose I have had made a scalpel with an enormous convexity of edge, or belly, near its point. This incision should not extend into the tarsus, but should lie rather between the latter and the conjunctiva, as it were, and should have a depth, in the middle, of about 3 or 4 mm., and then be laid open, or made to gape, to its utmost extent. Then the lid is turned down and while its hæmorrhage is stanching, we pass to the next steps of the operation, viz., a slight modification of the excellent operation devised by Dr. Hotz, of this city, combined with a counter-

grooving of the tarsus. A broad hard-rubber spatula is inserted beneath the lid and its end pushed up in the upper fornix of the conjunctiva, and held there by an assistant. With the same extra-convex scalpel, an incision is made through the integument and through the underlying orbicularis muscle, *usually not over 4 mm. from the free border,—sometimes less, as when the tarsus is greatly atrophied,*¹ and extending somewhat beyond the line of the canthus at either end. The lower flap of this incision, with its portion of the orbicularis, is now dissected up, denuding the tarsus, *clean down to the point where the cilia are seen to cross, like stitches in a seam*, the bottom of the incision, or the pocket thus formed, taking great care not to button-hole through. For this it is best to use the point of the scalpel with the edge turned backward, an assistant meanwhile pushing up the brow with the thumb. The dissection being complete the full length of the tarsus, catch hold, with mouse-tooth forceps, of the muscle contained in the lower flap at one end of the incision, and excise the whole of it by means of blunt-pointed, curved scissors. Now re-insert the spatula and cut a wedge-shaped groove in the middle of the tarsus, nearly its entire length. After this, introduce the sutures to complete the Hotz operation. The needles should be about an inch long, of the half-curve variety, and the thread No. 3 black, braided silk. Three to four sutures, owing to the length of the tarsus, are employed. The needle is first passed through the lower flap, taking a good deep bite, *then carried just beyond the upper border of the tarsus, and dipped in and out through the deep fascia that serves as the ligament of the tarsus, thence well up beneath the upper flap*, which is lightly dissected back for the purpose, *and out through the skin about half way up to the supercilia*. Next, the tying of the sutures; and here the closest attention to the detail of every manœuvre is of the very greatest moment. Clean all of the fibrin out of the incision back of the cilia, and from beneath the flaps over the tarsus. The lower flap must be free to slide over the tarsus, in tightening the sutures, so as to strut the cilia upwards like the tail of a peacock, which it could not do if glued tightly down.

¹Those portions of the description of this operation printed in italics refer to features which were, to the best of my knowledge and belief, first practiced by me, and constitute the modification alluded to.

by fibrin. Tie the central sutures first. *Make the double turn in one thread then give the lower end to the assistant, catch hold of the edge of the lower flap with the forceps, place it beneath the edge of the upper flap, and turn it down in contact with the ligament of the tarsus, just where it is pierced by the second dip of the thread, simply tucking back the upper flap, edge inward; push downward with the ends of the forceps, (or have an assistant do so with a probe), on the tarsus to be sure that it breaks with its convexity downwards, closing up the newly-made groove; and now, operator and assistant pull together on the ends of thread and draw it tight. Were the tarsus not pressed down in its middle, it might bend the wrong way—i. e., with its concavity downwards, and thus increase the very deformity it was the aim to correct.* If all has gone well, the free border is now directed upwards, and the incision made behind the cilia is widely yawning. Prepare the lower lip, grasp it with finger and thumb of left hand, roll it tightly over the ball of the middle finger, and, with one snip of the long-bladed, strong, straight scissors, excise an ellipse of mucous membrane sufficient to fill completely the cut back of the lashes; drop it in 4% boric acid solution at about 110° F., take it out and turn it face down on the left thumb-nail, trim off, with scissors, the bunches of adipose tissue, and place it nicely in the cut absorbing all oozing and moisture about with bits of cotton well wrung out of boric acid solution. Do not suture it, for it will cling as if by instinct. Lastly, stitch the conjunctiva to the integument as the finishing touch to the canthoplasty as well as to the whole operation. The dressing consists of a thin sheet of absorbent cotton, next to the eye, wet with warm 4 per cent. boric acid solution, each ounce of which contains about a drachm of sterilized glycerine, added for its hygroscopic effect; a good-sized pad of dry cotton, and a mosquito-net roller applied wet. The dressing is removed at the end of forty-eight hours and reapplied, after which daily for at least ten days to two weeks. I have learned not to leave off the bandage earlier, for the reason that I saw two or three of the mucous grafts perish from sheer drying up before adopting the longer bandaging. Even after the bandage has been discontinued, the grafts should, for a time, be kept greased with sterilized vaseline.

In my practice, all four of the above described operative features, canthoplasty, Hotz operation, counter-grooving of

tarsus, and post-cilia mucous graft, are nearly always combined in the one sitting, which has come to be known as the Eye and Ear Infirmary, *à la* Trilby, as "the all-together." They are thus combined not for convenience, but because experience has taught that, by so doing, the effect is greater, better, and more lasting. If all were done piece-meal, *i. e.*, for instance, the canthoplasty to-day, the Hotz next week, the grafting the week after, and so on, the ultimate result would most likely be poor or *nil*.

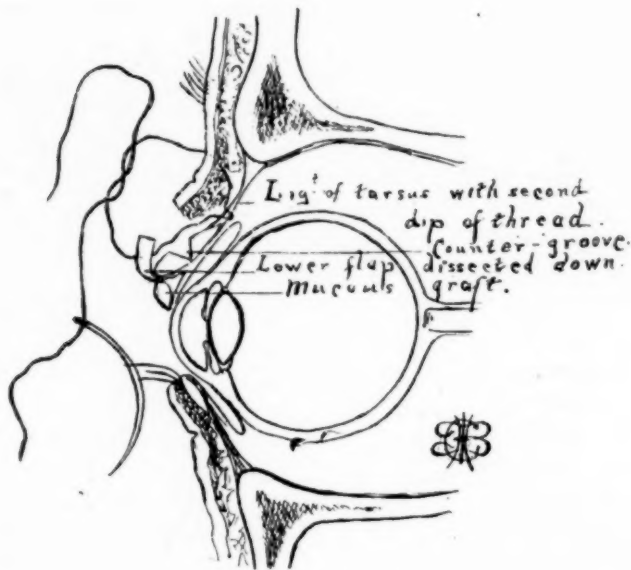


Fig. 1.

Skin-grafts for the restoration of the free border I have long since abandoned, though many claim that they are just as good as those of mucous membrane. The last bit of skin I made use of in this connection was one I put into the border of the lower lid, and which rested directly upon the cornea. Very shortly an ugly ulcer appeared on the cornea immediately under the graft. No hairs could be found in the piece to cause the irritation, but it was observed that, while all the rest of the lining of the lid was constantly moist, the graft itself remained dry; and it was only by the excision of the bor-

rowed tissue, and the substitution of a mucous graft from the lip that we were able to cause healing of the ulcer.

The accompanying sectional drawing, Fig. 1, will serve, at a glance, to illustrate the above described methods. Figures 2 and 3 show a pronounced case of entropion just before, and ten days after, the operation.



FIG. 2.

"The 'all-together' is not required for the lower lids, the grafts alone being commonly quite adequate.



FIG. 3.

With regard to the other varieties of blepharoplasty referred to at the outset, I must try to be more concise, having already occupied too much valuable space.

Like all the other departments of medicine, that of blepharoplasty is overburdened with an elaboration of names and synonymous terms. Inasmuch as the essential object in those operations is the restitution of missing parts, the names and terms have reference to the originator and the quality of the borrowed tissue; hence, we have in early times the Branca family of Italian surgeons, Fricke, Blasius, Dieffenbach, Desmarres, etc. And more recently Arlt, Lawson, Wolf, Reverdin, Ollier and Thiersch. We have autoplasty, heteroplasty, transplantation and transportation. It may be said in passing that one may, on occasion, serve one's self well with most any of the different methods. But, simplified, and made to conform to more modern ways of doing, the *terms* may be reduced to two,—graft, meaning either skin, epidermis, or mucous, when bodily lifted and transferred to another place; and *flap*, when not entirely removed from its proper site. In the matter of skin-grafts, three names are useful in designating the kind—Reverdin, when they consist of small islands of epidermis; Thiersch, when they are of larger size; and Wolf, when the whole thickness is meant.

I have learned to employ grafts in most all cases of restoration of the lid, as the resulting scar whence the piece is taken, is out of sight, whereas, in resorting to sliding flaps, the cicatrices about the eyes are multiplied. Of the three kinds of graft those named for Wolf are by far the most valid and satisfactory for blepharoplasty of the integument. When taken from the inner aspect of the upper arm their thickness seems just right, and with care and cleanliness they may be cut of great size, with good assurance that they will survive. Their proneness to shrink and shrink, however, is often forgotten, and thus many failures arise. To replace the lower lids in the case shown in Figures 4 and 5, for example, where the areas to be supplied measured each about one inch in length by about a half inch in breadth, I cut from each arm a graft $2\frac{1}{2}$ " by $1\frac{1}{2}$ ". The second picture was taken two weeks after the operation and shows the lids still pushed high up on the eyes. Ultimately though, they will drop down enough. Over-effect is just as desirable,—yea, as imperative,—in ectropion as it is in entropion.

Now, and then, where there has been extensive destruction of the lids, and the system of restoration is of necessity

complicated, especially where there is plenty of available integument in close proximity, sliding flaps are of the greatest advantage. Such was the case in Fig. 6, where an epithelioma had destroyed the whole of the lower lid, the outer third of the



FIG. 4.

upper, the external canthus, and a good portion of the ocular conjunctiva. Here, after removing all of the growth, I slid in, from the cheek, an immense mitten-shaped flap, with a broad



FIG. 5.

pedicle, stitching it externally to the skin and internally to the conjunctiva. The photograph was taken about two years after

the operation. This patient has perfect control of the movements of the lids.

Thiersch grafts I have found serviceable only when a part has been left devoid of epidermis, and likely to leave too much of a scar on healing. This happened, for instance, at the widest part of the "mitten" just alluded to, where the skin of the cheek could not be approximated. When it was nicely granulating, I applied a large epithelial graft with happy consequences.



FIG. 6.

A few general considerations, and then I will close. That absolute cleanliness of parts, hands, instruments and thread is indispensable, goes without saying. I find that some men who are exacting enough in all the other of these particulars will neglect their thread; yet it is around this that infection, when it occurs, is usually first seen. As to the antiseptic chosen, I rely mainly on fresh 4 per cent. boric acid solution, made with newly boiled distilled water, used very warm, for the irrigation, immersion of the grafts, and all. I avoid, as much as possible, the use of fixation or other forceps in handling the grafts and flaps, for they chew and maim. The fingers, whenever feasible, are infinitely superior.

OPHTHALMOLOGICAL TESTIMONY IN A MEDICO-LEGAL CASE.

BY L. R. CULBERTSON, M.D., ZANESVILLE, OHIO,

OCULIST TO U. S. PENSION BUREAU; C. & M. V.; B. Z. & C. EYS.; CITY HOSPITAL, ETC.

THE plaintiff in the damage case of A. Hartsough *versus* J. Stitt and J. W. Frazier, of Frazeyburg, Ohio, came to my office for examination of his eyes May 11, 1897.

Examination revealed the following history: December 25, 1895, was working in a well and about twenty feet from the surface of the ground. Stitt was lowering into the well a forty-pound tile, when the rope broke and the tile fell striking plaintiff on top of the head. He was not unconscious but very much dazed, and after being taken from the well walked a short distance to the house and became sick at the stomach and very weak. He had to stay in bed for several days and suffered from nausea and vomiting, but was not unconscious. After this he got up and walked about but was very weak and soon began to lose flesh (he has lost forty pounds), and says he has not been able to work. He does not have to get up at night to urinate and urination is normal in frequency in daytime. He has no rheumatism; does not drink, and never had venereal disease. He has suffered from malaria considerably in his lifetime. There is no insanity in the family.

EXAMINATION OF EYES.—Pupil reflexes, both direct reflex and consensual reflex to light, as well as accommodative reflex normal. No ptosis, nor paresis of ocular muscles. Visual fields in both eyes to colors concentrically restricted, left worse than right. Ophthalmoscopic examination: R. E., media normal. Outer half of disc slightly pale, inner half hazy. Disc shows marked atrophic cupping in outer half. Veins enlarged and tortuous. Arteries about normal. No haziness of retina. L. E., disc very pale and shows atrophic cupping. Inner half very hazy and outer half very pale. Veins enlarged and tortuous. Arteries somewhat diminished in calibre. No haziness of retina. Tension normal, both. Skiascopy shows + 1 D. s., each eye. Vision: R. E., + 1 s. = $\frac{6}{x}$; L. E., the same. V. = $\frac{6}{vi}$.

INJURY TO HEAD.—Has deep scalp wound about two inches long, crescentic in shape and points of crescent pointing forward. I can not detect any fracture or depression of the bone. The wound is on the vertex at the junction of the occipital and the inter-parietal sutures.

SYMPTOMS.—Stands with feet together and eyes closed. Walks with great difficulty in a straight line with eyes closed. Knee-jerks normal. No locomotor ataxia. Does not scan speech; no nystagmus. In carrying a glass of water to his lips with the left hand marked tremor occurs, but this does not occur when the right hand is used. (Symptom of Charcot's disease—disseminated sclerosis).

ÆSTHESIOMETRY.—All points normal, save palm of right hand, which at six lines and at less distance than six lines, feels three points instead of two. Right cheek feels three points at five lines and two points at eight lines. Left hand normal. Right side of forehead three points at ten lines. Left forehead normal. This peculiar anæsthesia shows lesion to sensation at the base of the brain. (See DaCosta's Diagnosis, page 64).

Muscular sense, right hand impaired. It is my opinion that this is a case of Charcot's disease (disseminated sclerosis) in its early stage. It is probable that there are several small spots of sclerosis in the left cortical sensation centers or involving the radiations from these centers. There is also, probably, a spot of sclerosis in the right side affecting the left arm.

No mind-blindness, word-blindness, epilepsy, etc. No paralysis. Slight optic atrophy, result of optic neuritis, occurring with meningitis, following the result of the injury to head.

Examination of urine showed sp. gr. 1023, no albumen, no sugar or excess of urates. Ureometer shows 2.2 per cent. urea or normal, showing no disease of kidney or rheumatism. Rheumatism tests, negative.

All of these facts were stated before the jury by the writer.

COUNSEL PROS.—State how blow on head affected this man's brain?

ANS.—By causing a subacute meningitis which subsided and left small spots of adhesion in meninges causing hardening at such points. The tunics of eye being continuous with

those of brain the meningitis extended into the optic sheath and thus affected the optic nerves.

QUESTION PROS.—You think, then, that the disease of this man's brain was due to the injury received?

ANS.—Yes, sir.

QUES.—Do you think chronic malarial poisoning could have caused this man's brain disease?

ANS.—No, sir.

QUES.—Do you attribute his great loss of flesh, since the injury, to brain disease?

ANS.—I do. I can find no evidence of chronic malarial poisoning.

* * *

The suit was for \$10,000 damages and the jury returned a verdict for \$2,000. The jury held that Stitt, the man who lowered the tile, was in no wise responsible, but their opinion was that Frazier (the owner of the farm), had been negligent in using a defective rope, and accordingly they assessed \$2,000 damages against him.

SOME OBSERVATIONS UPON THE IRRITATING EFFECTS OF THE NATURAL GAS UPON TRACHOMA.¹

BY JOHN J. KYLE, M.D., MARION, IND.

I DESIRE, in a general, way to call attention to the irritating effects of the natural gas upon the conjunctiva, with special reference to its effect in the production of trachoma.

The Indiana gas belt covers a territory, approximately of 2,500 square miles, with a population of 300,000. The general characteristics of the natural gas are its combustibility and chemical destructibility. The atmosphere is constantly permeated with the gas. In consequence delicate fabrics, draperies, wall paper, books, leather, upholstery, surgical instruments,

¹Read at the Second Annual Meeting of the Western Ophthalmological, Otological, Laryngological and Rhinological Association, held in St. Louis, April 8-9, 1897.

metallic instruments of all kinds are destroyed or tarnished. To our great annoyance, the gas seems to have a special predilection for politzer bags.

Eminent chemists disagree regarding the relative constituents of natural gas. The most trustworthy is from the last report of Mr. J. C. Laach, Natural Gas Inspector of Indiana, and is as follows:

| | | | | |
|------------------------|---|---|---|----------------------|
| Carbon, | - | - | - | 70.25 |
| Hydrogen, | - | - | - | 21.45 |
| Sulphuretted Hydrogen, | | | | .17 |
| Carbonic Acid, | - | - | - | .02 |
| Nitrogen, | - | - | - | 7.95 (by difference) |

100.

Eighty-five per cent. of natural gas is marsh gas which is composed of 75 per cent., by weight, of carbon and 25 per cent hydrogen.

The burnt gas which we will have occasion to refer to, is composed of carbon dioxide, nitrogen oxides, sulphur dioxides and trioxide, and water, the relative amount of each constituent is governed by the combustion, differing in every case.

It will take but a brief stay in the gas belt to convince one of the singular irritating effect of the gas. During the winter months, on account of the cheapness of the fuel, there is a great tendency to over-heating and bad ventilation, not alone this, but the escaping, burnt gas from stoves and jets fills the atmosphere, thus producing a carbonic acid poisoning. It has been my observation, that in all cases of conjunctival inflammation which respond but reluctantly to every form of treatment, and in spite of every effort to combat the disease, the condemning of jets and substitution of lamps have in every case, after a short time, shown marked evidence of benefit. The products from imperfect combustion from jets is the potent factor in stimulating the growth of this disease. In many cases where sleeping apartments are for any length of time illuminated, eyelids, otherwise normal, upon awakening, are swollen and congested, due more especially to the local irritation in the nose and throat, which are in acute cases found dry and swollen with scanty secretion. When electric lights are substituted a change is at once noted. This is a common oc-

currence. I have personally experienced it. After a time the tissues seemingly adjust themselves to the change, and return to a normal condition. This adjustment may take weeks or months, or they may possibly never become free from irritation.

The population of this city, Marion, Ind., and immediate region, is cosmopolitan, being made up of native people and immigrants from Eastern States,—Belgians, French, Welsh, Indians and a very large settlement of negroes.

Dr. Burnett's valuable researches have established the peculiar immunity of the negro race, as well as the geographical distribution of this disease. In regard to the Indians, so far among seven hundred, all civilized, I have failed to see or hear of a single case. This will not apply to the Indians of the Northwest, where all forms of eye-disease develop very prolifically.

Throughout this region of Indiana, the native people are the ones most susceptible to this disease. Among twenty-five cases under observation during the year 1896, all were native born. The disease was not confined to one locality, occupation or station in life. In two cases the disease was monocular.

The balance of proof is yet in favor of the disease being contagious and infections, due to the trachoma coccus, so named by Michel, of Germany. Among those who advocate such theory are Fuchs, Meyer, De Wecker, Berry, and in this country, Holt, of Portland, Me.; Randolph, of Baltimore; Cullen, of New York; Ray, of Louisville; Savage, of Nashville. (From "Racial and Geographical Distribution of Trachoma in America," by Burnett, in *AMERICAN JOURNAL OF OPHTHALMOLOGY*).

On the other hand, Burnett, Blauw, Forester, and many others deny the contagiousness of the disease.

I believe in the "transportation from person to person as proven by Schmidt-Rimpler in Hesse." This may result from direct infection or through the air. Whole families under observation have become inoculated,—father, mother and six children. In one other case, mother and three children, and so on. They all show the characteristic conjunctival cicatrization.

I recognize two distinct stages of the disease, acute and chronic; I do not believe that the cicatricial stage of the disease is a subdivision of trachoma. To my mind it is rather the sequela of the second or chronic stage. When scar tissue

takes the place of granulation the disease becomes anatomically and pathologically a new disease — "cicatricial conjunctivitis."

We recognize a clinical difference between trachoma and follicular conjunctivitis. In this latter we have "tumented lymph follicles" appearing only on the lower lid, about the size of a pin head, transparent and vascular, arranged in rows parallel to lid margin. Furthermore, cicatricial change is not a pathognomonic sign of pre-existing trachoma.

The disease may be treated and cured without leaving signs behind, such results occur only when patient is seen early and granulations are few. Spontaneous recoveries are reported. The tendency, however, of each granulation is to leave a scar, due to shrinking of conjunctiva.

In our many surgical methods, scissors, grattage, expression, or expression by forceps, the utmost care is necessary.

Dr. Greef (*Archives of Ophthalmology*) very aptly portrays the ill result when he says: "We saw several times in out-clinic cases which have been operated upon (Heisrath method) in this manner at Königsberg exhibiting the saddest sight imaginable."

The ultimate recovery of patients depends upon careful treatment, cicatricial change resulting as a rule; it is necessary, therefore, to avoid adding a tendency to such a condition.

The first step in the treatment should be the correction of any interference with the perfect drainage of conjunctiva. If there be any occlusion or inflammation of the duct, it should be divided and thoroughly syringed with a mild alkaline solution, thus restoring and keeping up a healthy condition.

One-half per cent. solution of pure iodine crystals in alboline (after Nesnamow) brushing on the conjunctiva, after thorough cleansing, to us has brought very satisfactory results.

Briefly, then, my treatment is as follows:

1. Careful attention to drainage.
2. Cleanliness, attention to nutrition and ventilation of apartments. The substitution of lamps for jets.
3. Complete removal of adenoid tissue by surgical methods.
4. Careful washing of the conjunctiva with sol. bichloride (1-5000) followed by application of iodine solution with massage as an adjunct.

5. The occasional use of the stick of sulphate of copper.

DISCUSSION.

DR. CORR.—I wish to indorse the sentiments of the paper so far as the "gas belt" irritation is concerned. But I believe the doctrine that trachoma is a disease of its own kind and can be communicated from one to another is a heresy from beginning to end. It is a complicated disease growing out of an anatomical condition of the parts; any simple so-called catarrh of the conjunctiva or an irritation of that kind can produce it by prolonged influence. I am aware that what I am saying is in the face of almost all the authorities in this country and a large part of the English, but I have not been able to find, from the clinical facts which have come to me, that the disease is a disease of its own kind, nor do I think it is of a contagious character. The pathology, I think, can be accounted for on a different theory from that of the presence of a microbe. I think the larger part of the so-called epidemics of this trouble are due to a condition of things entirely independent of the idea that it is contagious. I have seen a number of whole families with the disease and the strange point was that none of them had any inflammation of the lids, but they all gave long-standing irritation of the eyes as a possible cause. Possibly, then, the trouble arises from some defect of ventilation in the sleeping apartments or something of a similar nature. I have seen the disease occur in an institution where there were a number of children occupying sleeping apartments that were very small. I think we can satisfactorily account for it in this and similar ways.

DR. REYLING.—I wish to say in regard to the histology and bacteriology of trachoma, that it is really due to a diplococcus. Dr. Byron has made a number of cultures in the Loomis laboratory, and after making the cultures he inoculated patients and produced trachoma. All irritating vapors and also powders have a tendency to make trachoma worse and any irritating kind of food, as salt meat, and highly seasoned food will aggravate trachoma. I have had a chance to find out by sending cases that were living in poor and badly ventilated apartments to the hospital where they received good food and pure air, and in a couple of weeks the disease had

improved. To be sure, they have not got well in three or four months, but they have greatly improved as soon as they got good food and pure air. About the treatment, this must be varied, according to the condition or variety of the trachoma. In acute cases, where there is a certain amount of muco-purulent discharge, the best treatment is to apply a weak solution of nitrate of silver, say about five to ten grains to the ounce, then neutralize that with a salt solution. Apply that once a day and besides that order some mild washes. For the chronic cases we have different methods. We have one variety which looks like follicular conjunctivitis, in which the granulations are very small. We find the upper and lower eyelids are yellowish in color. For that variety the best treatment is to use \mathfrak{z} ij of tannic acid to \mathfrak{z} j of glycerine, applied once a day. Then the patient should apply to the eyes a weaker solution of ten grains to the ounce three times a day. I have succeeded in curing in three or four weeks cases of this form. In cases where the granulations are larger, we should use Dr. Knapp's or the forceps of Dr. Noyes', and remove the granulations. If the work is carefully done you will have no scar tissue or a very slight amount of scar tissue afterwards. This must be done thoroughly and carefully. Another variety is called trachoma which is not really a true trachoma and is due to a hypertrophied rhinitis. For this form of the trouble the chief treatment is to remove the cause which is the hypertrophied rhinitis.

DR. WHEELLOCK.—The diplococcus which causes this trouble no doubt exists, and so far but little progress has been made in destroying it. I have tried a little method which has served me pretty well in many cases and that is by the sub-mucous injection of a neutral salt solution. I have had many cases in which there was repeated occurrence of the disease, and in that class of cases I find the sub-mucous injection or infiltration of the tissue by a neutral salt solution will produce an extensive swelling of the membrane, and by then painting this thoroughly with various solutions you get a more complete effect.

DR. BULSON.—I would like to ask Dr. Corr if I understood him to say that he did not think trachoma was transmissible?

DR. CORR.—Not as trachoma.

DR. BULSON—My experience has been different. I am satisfied that we find what I call typical trachoma spreading by direct transmission. We have at Fort Wayne an Orphan Asylum in which there are confined 160 or 175 children. A child with acute trachoma was taken to that Institution and not long afterwards others of the children were infected. These children were kept in a very cleanly condition, well fed, well clothed, their appartments were light and airy, the surroundings were healthful, and as good as could be obtained. As I say, two or three weeks following the committment of this child, four or five cases of trachoma started. I informed the nurses that it would probably run through the school unless the utmost precaution was taken. They replied that they could not quarantine them, and could not take care of them as they ought owing to the fact that they had insufficient help. I told them they would have to take the consequences. It did go through the school till we had 160 cases. This occurred, to my knowledge, directly from this one case introduced into the Asylum. I have only a few words to say in regard to the treatment. I am a strong advocate of the use of nitrate of silver, especially when there is an abundance of discharge. I use it in the strength of ten to twenty grains to the ounce, neutralizing it afterwards. I have had success with a solution of iodide of potassium and nitrate of silver, using it in the same manner. I think it has a less deleterious effect on the cornea, in fact, it is said that corneal ulcerations offer no objection to its use, but it serves best in acute trachoma. I consider the mixture, the formula of which was published in 1884, as one of the best that can be used, and I think ophthalmologists in general would appreciate it if they used it. It consists of two solutions known as No. 1 and No. 2, the first containing silver nitrate, glycerine and water; the second containing iodide of potassium, glycerine and water; two drops of the second solution being added to one of the first, a drachm of iodide of potassium and a drachm of nitrate of silver being used to the ounce. This produces, when mixed together, a yellowish solution, probably the iodide of potassium and nitrate of silver, which, when applied to the conjunctiva, act in the same manner as a ten to twenty grain solution of silver would and without any effect upon the cornea whatever. This is a solution which can be entrusted to the nurses of an institution without

danger of doing harm. I consider this solution preferable to nitrate of silver solution in acute trachoma. It may be applied repeatedly without leaving any effects behind. The 160 cases spoken of were treated with it and they all did well, the last of them are just recovering from it now. The epidemic began a year ago.

DR. GEO. KNAPP.—I merely wish to state that it is an historical fact that after Napoleon's return from Egypt with his great army many of the soldiers were returned to their homes affected with an acute, chronic or subacute trachoma, and the German physicians did not understand it, and in consequence, a great portion of the German Empire became afflicted with the disease which afterwards was known to be trachoma. This, to my mind, conclusively teaches that the disease is transmissible.

DR. KYLE.—I have not much to say in conclusion. I think Dr. Corr is justifiable in taking the stand he does from the fact that we have not heard of the bacteriologists finding the trachoma microbe. In the treatment there is a wide range, of course, and we must adapt it to the case on hand. I believe that the consensus of opinion is that the disease is transmissible.

SKIN-GRAFTING FOR MALIGNANCY OF THE ORBIT AND ENTROPION.¹

BY FLAVEL B. TIFFANY, M.D., KANSAS CITY, MO

IT is more than fifteen years since I made the discovery that skin-grafting was a specific in epithelioma of the eyelid and orbital tissues. It was in September, 1882, that I gave this discovery to the medical profession by the publication of a case of epithelioma of the eyelids, eyeball and entire orbital contents (of Richard McGee, of Galena, Kansas). The article, with three wood cuts, illustrative of the case, was published in the *St. Louis Medical and Surgical Journal*, edited by

¹Read at the Second Annual Meeting of the Western Ophthalmological, Otological, Laryngological and Rhinological Association, held in St. Louis, April 8-9, 1897.

Dr. Rumbold. I presume that if the Doctor is present to-day he may recall the case, or if not, he can find it by referring to his file of the September number of 1882.

No mention up to this time nor for several years subsequent had been made of skin-grafting as a therapeutical agent in epithelioma. It was merely by chance that I discovered the potentiality of these healthy skin-plants in smothering out these malignant growths. In the case mentioned and published, I had to sweep away both superior and inferior lids and exenterate the entire contents of the orbit; as the eyeball and surrounding tissues, as well as the lids, were involved by the epithelioma. The cutting away of the lids and the exenteration of the orbital contents did not control the disease. It persisted in reappearing, even after it had been cremated by the Paquelin's thermo-cautery and was not smothered out until large skin-plants taken from the patient's chest were planted over the granular surface of the cauliflower growths which persisted in springing forth from the periosteum of the orbit, especially from its apex. After the grafts were made to adhere (and there was no trouble in this), they grew with tenacious avidity, although they were large as silver quarters. There has been no further appearance of the malignancy either in the orbit or metastatically.

Fourteen years have passed and the man is so far perfectly immune. I have had several cases of epithelioma since, involving the eyelids, and I have in each case resorted to this plastic treatment effecting a permanent cure in each case. These skin-grafts, or the healthy action of their cells, have a potentiality that decidedly dominates the cells of the cancerous growths; the former destroying the latter, changing the malignant into benign. I have used skin-grafts repeatedly for burns and phlegmonous inflammation of the lids where extensive sloughing had taken place with good results. In some cases I have used plants an inch and a half by two inches in size. I am always careful to cut the plants nearly one-third larger than the dimensions of the bed in which they are to be planted, as these grafts always shrink more or less, especially if they contain much areolar tissue. I am careful to take the skin-grafts void of any connective or adipose tissue and transfer them directly without handling. I am also careful to have all blood staunched before planting them, otherwise the grafts may

slough aside from the eyelid. I have a case in mind, a man of about forty-five years, where the cancerous growth had eaten away part of the pinna of the concha. I was obliged to remove the entire expanded portion of the external ear; and soon after this the malignancy began to make inroads up the external meatus, and had gained nearly one-third of the extent of the canal. I then removed by scalpel all the disease visible, and planted there pieces of delicate skin, cut from the patient's arm. This operation was made some three years ago, and there has been no return of the cancer.

Besides using skin-grafts as a therapeutical agent in malignant growths I frequently use them in the correcting of entropion. I take the strips of integument from the lid 2 or 3 mm. from its margin, cutting them 2 or 3 mm. wide parallel with the margin of the lid. I then split the tarsal cartilage near the ocular intra-marginal space from the punctum to the external canthus and then transplant the strip of skin, thus wedging the margin of the lid with all of the cilia from the cornea. Occasionally in taking the strip of skin I go deep into the tarsal cartilage and remove a wedge-shape piece of this tissue which I transplant with the skin. I never use a pedicle, but fasten the graft at either end and at the center by delicate silk sutures. Where there is atrophy of the tarsal cartilage at the margin of the lid, as there frequently is, with the lashes turned under sweeping the cornea, I make Green's operation, and with the grafts build up the atrophied tissue, thus wedging the lashes from the eyeball into normal position.

DISCUSSION.

DR. REYNOLDS.—Will you please answer me a question. I did not quite understand where the graft is made in a case of entropion where there is loss of substance from the border of the lid, do you make it from a distance or how do you make it?

DR. TIFFANY.—I usually take a piece from the lid, a completely detached graft without any pedicle, removing the strip of integument two or three millimeters from the margin of the lid, then split the lid in the inter-marginal space and transplant this. Sometimes I go deeper than the integument, into the tarsal cartilage, and take out a wedge-shaped piece of cartilage so as to pass up the margin of the lid better.

DR. REYNOLDS. — Skin-grafting was introduced in this country by a re-publication of an article from an extract from a prize essay by a Frenchman named, I think, Reverdin, and subsequently, in 1870, the late Dr. John T. Hodgen wrote on the same subject. In the meantime I had made a couple of experiments or experimental attempts to use it and in one case of entropion of the upper lid, with profuse loss of substance near the central portion, I dissected up and transplanted a portion of skin taken from the forearm of the patient and everything seemingly did very well for the first two or three days; it underwent the peculiar change described by Reverdin and I thought the patient was doing very well. But one night after midnight I was summoned to see him and found him in a state of collapse, from loss of blood, and I hesitated as to what I should do, and so I did what was then a new operation, I divided the external commissure of the eyelids and then split the free border and without removing any portion of the skin above at all I slipped it up higher and the patient made a very satisfactory recovery. I have had other cases in which that proceeding was not sufficient and where the cartilage had been absorbed. In that case I have divided the free border of the lid, notched it upwards at the outer canthus and the inner canthus performing in some cases external canthoplasty and then dissected up a bridge of the sound skin a distance of two or three millimeters above the line of the lash and about two millimeters broad and passing that down and stitching it at two points only near the outer canthus and near the inner canthus and allowing the center portion to lie loosely. I have never seen sloughing take place after such an operation and I have nearly always had the happiness to observe an entire recovery from the entropion. As to cutting out a wedge-shaped piece of cartilage or detaching the cartilage or cutting the elliptical fold of integument down to the surface of the tarsus, I believe I have gone the rounds, I have tried all of them, also the operation advocated some years ago by Dr. Hotz, of Chicago, seemed satisfactory in some cases, but in nearly all of them the entropion returned. So the transplanting of a bridge of skin from above is the quickest and most satisfactory, combined with external canthoplasty. I am sure that no operation will apply to all cases, but I am equally sure that Dr. Tiffany's experience is valuable and the method he uses does apply to

some cases and gives a more reasonable prospect of relief permanently than perhaps any other operation.

DR. WHEELOCK.—I would like to ask for some information about a case. A year ago last fall I enucleated an eye for an epithelioma occurring at the outer canthus involving the eyeball and rectus muscles and periosteum. I took away the entire upper and lower lids going well into the temple. I eviscerated the orbit, took out its entire contents, packed it with a 50 per cent. solution of chloride of zinc. After this the patient went away; but in about a year she returned to my office and I found that the orbit was covered entirely with a dermoid covering; there was no trace of an operation or of a scar visible to the naked eye. I am at a loss to know just what occurred there.

DR. REYNOLDS.—What was the lapse of time?

DR. WHEELOCK.—About one year. Dr. Bulson saw the same case.

DR. ALT.—You did not attempt any covering of the bone of the orbit?

DR. WHEELOCK.—None whatever.

DR. ALT.—Was the periosteum removed?

DR. WHEELOCK.—It was scraped but no chiseling or anything more than complete scraping was done.

DR. REYNOLDS.—My impression is that you have had the same experience as myself. I removed an immense sarcoma from the orbit in a gentleman, 24 years of age; he had a young wife with the prospect of an heir to his estate—which had not yet been paid for—the estate I mean; he was a driver for the Adams Express Company, was very much emaciated at the time of the operation; he gained flesh rapidly and improved in every way and in a few months' time the orbit was covered over with the same sort of growth or in the same way, the ordinary process of cicatricial contraction, the stretching of the contiguous integument. He went on five long years without any signs of trouble and just about five years afterwards the parotid gland became enlarged and in a few months a melanoma appeared at the brow. I did not use so strong a chloride of zinc solution, mine was only half a drachm of chloride of zinc to an ounce of water. My patient died, but he had recovered from the operation sufficiently to go back to his work and earn enough money to pay for his home and beget two

more fine children, and he died with an insurance policy of two thousand dollars on his life, leaving his widow that amount besides his home. The point I make is that the cicatricial contraction closed the orbit, but the Doctor will likely hear from the trouble again.

DR. TIFFANY.—I would like to say in reply to Dr. Reynolds in regard to skin grafts being introduced that, according to my knowledge, I still maintain that those grafts which were used at that time were merely shavings placed on the ulcer to cure the ulcer. But I use them to cure and destroy the epithelium,—the cancer cells. That has never been mentioned in any article that has ever been written prior to the one that I wrote. I claim in this case that the graft has a specific effect in destroying the malignant cells—these healthy cells kill the malignant cells, it is like grafting a sour apple tree, as it were, and bringing forth good fruit. In these cases the epithelioma of the orbit or of the lids is cured and there is no return, which is almost sure to happen unless you put in the grafts. These healthy grafts prevent the return of the disease. That has been my experience not in one case, but probably in from fifteen to twenty cases. In regard to making canthotomy, I sometimes make that, but it always leaves a deformity and I avoid it unless it is absolutely necessary.

A CASE OF MENTAL DEPRESSION APPARENTLY DUE TO A GRADUATED TENOTOMY; AND THE USE AND LIMITATION OF PRISMS.¹

BY W. H. BAKER, M.D., LYNCHBURG, VA.

GRADUATED TENOTOMY, as all of you know, is an operation devised by Dr. Geo. T. Stevens, of New York, for the purpose of producing an equilibrium in the action of the external ocular muscles, when there is a lack of balance, or a disharmony in their action.

Although weakening a strong muscle, instead of strength-

¹Read at the Second Annual Meeting of the Western Ophthalmological, Otological, Laryngological and Rhinological Association, held in St. Louis, April 8-9, 1897.

ening a weak one, is seemingly an illogical procedure; still the operation is undoubtedly often followed by most excellent results, and I presume seldom does harm. The devotees of this new departure in ocular surgery soon published long lists of cases of epilepsy, locomotor ataxia, and kindred nervous troubles cured by graduated tenotomy. They positively made those gentlemen who give their whole attention to nervous diseases turn green with envy. Failures were so rare in their published accounts that the more thoughtful and conservative members of the profession were led to exclaim with Falstaff, "Lord, Lord, how this world is given to lying." Many aspirants for registration in the temples of fame flooded us with descriptions of new instruments for doing the simple little operation. But alas, for human hopes, many of these devices which brought so much joy to the heart of the inventor, now adorn the immense heap of useless relics, stored away in the medical mausoleum.

Sometimes the operation of graduated tenotomy has but little physical effect, if indeed any, when at the same time it may have a favorable mental effect. I think we will all agree that like many other minor operations it does occasionally relieve the condition by a favorable mental impression. Yet, in order to be consistent, we are obliged to admit that it may sometimes produce a very unfavorable mental impression. And in the particular case that I will relate, the mental deviation was in the wrong direction. I have seen several cases of a milder form, but this case is unique in my experience, as the result of an ill-advised graduated tenotomy.

In February, 1896, Mr. E. G. consulted me in regard to his condition of intense mental depression, which he attributed to an operation that had been done upon his eyes. He was a man of good physique, highly nervous temperament, unusually good mental development, and exceedingly sensitive to all extraneous impressions.

He gave me the following history: When about 15 years of age (he was then 22), while a student at one of the colleges, his eyes commencing to give him trouble, he consulted an oculist, who discovered and corrected a vertical astigmatism, thereby giving him perfect relief. The principal of the school being very ambitious for him, persuaded him to undertake too much work. His eyes again failed him, and very soon he

found it necessary to abandon his studies altogether. He then consulted an oculist in one of the large cities, who told him that while he had a refractive error, the whole trouble was caused by an esophoria of 3° in one eye and $3\frac{1}{2}^{\circ}$ in the other, and very strongly advised the operation for weakening the opposing muscles. He finally consented, and the operation was done upon both eyes at one sitting. The surgeon told him that the muscle strength of one eye was reduced 3° and the other $3\frac{1}{2}^{\circ}$, thereby producing a perfect equilibrium.

The operation did not relieve him, and instead of repeating it, the oculist adjusted prisms and corrected the hypermetropic astigmatism. This gave him partial relief, but he was never enabled to resume his studies at the college. He was finally able to do some newspaper work which he accomplished with very little discomfort, until he accepted a position in New York and removed to that city. His work there was very arduous and soon caused pain in his head and eyes, and this combined with some spiritualistic ideas which he had lately imbibed threw him into a state of intense melancholia, from which he has never entirely recovered.

An examination proved that he had compound hypermetropic astigmatism, both eyes $+4.5$ D. $\ominus +.50$ D. c. ax. 90° , and about 4° of esophoria in each eye, showing that if his statement was correct as to the degree of esophoria (and I believe it was) at the time the operation was performed, this operation had little, if any, effect in producing a balance or equilibrium in the muscle action. The ophthalmoscopic conditions were, and always have been, perfectly normal.

He said that the ends of the tendons that had been clipped felt as if they were loose, and he kept his eyes rigid, for fear of dislodging the muscles. Light was often very disagreeable, and frequently painful, especially when he felt that he was looking into the sun. He wore blue glasses and prisms alternately. He said that once, while visiting in one of the large cities, he consulted an eminent oculist, who told him that the wrong set of tendons had been clipped and that the esophoria was increased by the operation, but he was so sure about the side of the eye upon which the operation had been performed that I am convinced that the oculist was mistaken. I believe the operation was done imperfectly, in a half-hearted, unbelieving kind of way, with the hope of a good mental effect,

which good effect failed to materialize. I simply ignored the esophoria and astigmatism and corrected about half the hypermetropia, and then after a few months had passed with some improvement, gave him the full correction. During this time he was undergoing constitutional treatment.

I received a letter from his mother a few months ago, informing me that he had improved very much.

He is still far from well, complains of an unpleasant light sensation, of soreness at the insertion of the tendons, and a disagreeable feeling of flattening of the eyeballs. These symptoms have produced a psychical effect best described as melancholia, which still clings to him with aggravating persistency.

Like many other minor operations, partial tenotomy can be done without producing any effect either for good or evil. And, unfortunately, some of the less scrupulous members of the profession, those who love money more than the honor of the profession, have taken advantage of this fact in order to enlarge their fees. They tell a confiding patient that an operation is necessary in order to give complete relief, and the fee is out of all proportion to the importance of the operation. I do not bring this accusation without abundant proof to substantiate it. I will briefly relate one case as a sample of a fairly good collection of similar cases.

A gentleman afflicted with myopic astigmatism had been wearing correcting lenses with perfect comfort for twenty years, but about a year ago his eyes began to give him trouble and he consulted me on one of his hurried trips to town. I found, on a very casual examination, that the myopia had increased and that he needed a change of glasses. He left hurriedly, saying that he would return in a few days and have the glasses adjusted. In the meantime he was called to New York on business. While there his eyes gave him so much trouble that he was compelled to see an oculist. The doctor gave him a very thorough examination and adjusted the necessary glasses, and then told him that in order to give him perfect relief it would be necessary to operate upon the muscles of the eyes. After some persuasion he consented. One eye was operated upon and he was then told to come back the next day for the other operation. But the glasses gave him so much comfort that he decided not to have the other operation per-

formed, and so informed the oculist, who promptly charged him an enormous fee, and when it was paid allowed him to depart in peace. He has since had no trouble.

Is comment necessary in such a case? It seems that the oculist was either riding a *hobby* at a fearful pace (which I can hardly believe) or was operating for a fee.

Occasionally we may find an increase of the heterophoria a few weeks after a graduated tenotomy has been performed. Only a short time ago I operated upon a case showing 10° exophoria immediately before the operation, and ten days afterward an examination revealed 12° of the same. My operation may not have been as clean cut, and as free from bruised tissue, as the work of more experienced operators, but I do not think this alone can account for the large increase in the esophoria. I believe it occurs with the best operations. When we consider the ordinary processes of repair and the methods used by Dame Nature in bridging over solutions of continuity, we can hardly be astonished at the occasional result mentioned. Nature chooses her own materials for repairs. She seems to use a very unyielding and inelastic tissue for the purpose. And so we are apt to find that the rectus muscle, instead of being weaker, and perhaps longer, is stronger and shorter after the operation, and the trouble is increased. When this happens I presume the thing to do, is to operate and re-operate until the tendon is weakened in spite of all opposition on the part of Nature. This fact, no doubt, accounts for the criticism made by the doctor mentioned in the narrative of the case of mental depression, "that the wrong set of muscles had been operated upon." And when I saw the patient several years afterward the cicatrix had yielded sufficiently to allow the esophoria to remain about the same that it was prior to the operation. In other words, Nature had restored the original condition.

In strabotomy we make a clean sweep of the tendon attachment and get the desired result not by weakening the body of the muscle, as in partial tenotomy, but by changing the leverage power by causing the tendon to become re-attached farther back to the globe, thereby shortening its pull, and then with the help of the focusing power of the eye, Nature does for us exactly what we wish. Nature is decidedly friendly to strabotomy, but very unfriendly to partial tenotomy.

I have not mentioned these things as an argument against graduated tenotomy, but against the atrocities and wrongs committed in its name. I do not think it has found its proper place in surgery. It is still lauded too much by its advocates, and too much decried by the unbelievers. It has not been thoroughly tested by unprejudiced witnesses, measured accurately as every surgical procedure should be, and stored away in its proper surgical niche, to be called for when actually needed. Instead of being a primary expedient, as many of its advocates make it, it should be a *dernier resort*, not in the common acceptance of this term, as the last thing to be done before death or utter failure, but with the confident expectation of a brilliant result.

When we find a case of heterophoria, the cause should be the first thing to seek. And then everything known to ocular science in the way of treatment should be tried before resorting to the operation. If we find that our patient is below *par* physically, it will require a great deal of skill in the selection of the proper remedies. If the heterophoria lies anywhere between 2° and 10° prisms will do wonders in giving relief.

I am surprised to know that many eminent oculists limit the application of prisms for the relief of muscular insufficiencies to the gymnastic exercise of the weakened muscles by opposing prisms. This plan of treatment is frequently attended with marked success if it can be carried out, but it is tedious and exceedingly slow in its effect, and therefore impracticable in the case of school children, except with those good little boys that are never known to live to a ripe old age, and to those other clever, bright-eyed little hypocrites, who are willing to wear gymnastic prisms until the end of time, if thereby they can make the eyes an excuse for escaping school. These shameless little wretches find that there is some trouble with the eyes that gives little, if any, inconvenience, but fools the doctor and parents, and they will work eye pain and gymnastic prisms for all they are worth. Needless to say that the remedy in such cases should be applied to that time-honored spot, which has made the birch famous in history.

I have seen so many cases of pain from heterophoria relieved by properly adjusted prisms that I do not understand how any one who has worked with prisms can limit their use to gymnastics alone; particularly in cases of exophoria and

esophoria and sometimes hyperphoria, but especially in cases of homonymous horizontal troubles the relief is frequently instant, complete and permanent. I find that the best results follow the use of *crutch* prisms in the case of young school girls about the age of puberty. The muscles are then lax, and a slight hypermetropia or astigmatism aggravated by, or complicated with, heterophoria, may cause no end of trouble until the heterophoria as well as the error of refraction is corrected.

I think it will be well to mention here, that sometimes, after we have carefully corrected the compound refractive trouble and find no muscular weakness, the patient will complain of a periodic, momentary, sharp, lancinating pain shooting through the eye. We examine the lenses and find that the optic centers line up all right, but we must not lose sight of the fact that the optician, in making the lenses, grinds the sphere on one side of the glass and the cylinder on the other, and therefore the optic centers of the cylinder and sphere may not be in exact line, thus causing a twist in the rays of light, which is very trying to the eye. We can only suspect this from the symptoms mentioned as following the correction, as we have no way of detecting this effect in the lens. I do not think this fact has ever been referred to before.

I do not think it necessary to correct heterophoria of less than 2° , and then only correcting from 15 to 50 per cent. in esophoria, and from 25 to 75 per cent. in exophoria; dividing the correction equally between the two eyes if possible. I believe that in the vast majority of cases of heterophoria ranging from three to eight degrees, prisms adjusted either for gymnastic exercise or as a crutch for the weak muscle the very best results are obtained, and the operation of partial tenotomy is contra-indicated. I am very much inclined to think that this operation should be confined to cases of at least more than 10° of muscular insufficiency, or where there is a great deal of pain and discomfort unrelieved by treatment and prisms. Every case of refractive error should be tested for external muscle trouble, and if any muscular insufficiency is detected we will be warned, and in case of future trouble we will know where to look for the cause of it.

Rapid advances have been made in this branch of our science in the past few years, and the waste places seem to be rapidly disappearing. But still there is a vast field of unex-

explored territory in this department of refractive errors and muscular insufficiencies. Astigmatism is still very elusive in many cases, and means for the relief of heterophoria are still in their infancy.

Drs. Stevens, Savage and many others in this country, and some few in the old country, are working intelligently, assiduously and faithfully in this department of ophthalmology. Our city confrères possess many facilities for experiment and study, and we of the smaller towns expect great things from them in the near future. We wish better and more accurate instruments for testing muscular insufficiencies, enabling us to arrive at quicker and better conclusions in regard to the degree of trouble and the amount of correction needed.

NOTE.—The case cited in the paper of having been operated upon by myself, which revealed 10° exophoria before the operation, and two weeks afterward 12° of same, I found, on my return home, completely relieved of eye pain. This, fortunately for me, proved to be a case of favorable mental impression.

[The discussion on this paper will appear in the next issue of the Journal.]